

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (currently amended) A method to update code in an information storage and retrieval system while that system remains in normal operation, comprising the steps of:

providing an information storage and retrieval system comprising one or more processors;

providing existing code, wherein said one or more processors use said existing code to operate said information storage and retrieval system, and wherein said existing code includes a Concurrent Code Load having (N) phases;

generating a code update image comprising a Temporal Coupling File, wherein said Concurrent Code Load includes instructions to read said Temporal Coupling File;

providing said code update image to said information storage and retrieval system;

executing the an (i)th phase of said Concurrent Code Load, wherein (i) is greater than or equal to 1 and less than or equal to (N), and wherein (i) is initially set to 1;

determining if said (i)th phase of said Concurrent Code Load invokes said Temporal Coupling File;

operative if said (i)th phase of said Concurrent Code Load invokes said Temporal Coupling File, reading instructions for said (i)th phase of said Concurrent Code Load from said Temporal Coupling File, and executing said instructions for said (i)th phase of said Concurrent Code Load;

completing said (i)th phase of said Concurrent Code Load;
ascertaining if (i) equals (N);
operative if (i) equals (N), operating said information storage and retrieval system using said code update.

2. (original) The method of claim 1, further comprising the steps of:
operative if (i) does not equals (N):
incrementing (i);
repeating said executing, determining, completing, and ascertaining steps, and optionally said reading, executing, and incrementing steps.

3. (currently amended) The method of claim 1, ~~further comprising the steps of:~~
~~providing a~~ wherein said Concurrent Code Load ~~which~~ includes (N) indicators, wherein each of said (N) indicators is assigned to a different one of said (N) phases, and wherein each of said (N) indicators can have a first value or a second value;

wherein said determining step further includes examining ~~the an~~ (i)th indicator;
operative if said (i)th indicator is set to said first value, ascertaining that the (i)th phase of the Concurrent Code Load does not invoke the Temporal Coupling File; and
operative if the (i)th indicator is set to said second value, ascertaining that the (i)th phase of the Concurrent Code Load does invoke the Temporal Coupling File.

4. (currently amended) The method of claim 1, ~~further comprising the step of~~
~~providing an existing code which includes a~~ wherein said Concurrent Code Load ~~comprising~~
comprises 10 phases.

5. (original) The method of claim 1, further comprising the steps of:

creating said existing code at a first time;

installing said existing code in said information storage and retrieval system at a second time;

creating said Temporal Coupling File at a third time, wherein said third time is later than both said first time and said second time.

6. (currently amended) The method of claim 1, ~~further comprising the step of:~~
~~providing a wherein said~~ code update image ~~comprising the~~ comprises a (m)th code update, wherein said executing step includes determining if ~~the a~~ (m-1)th code update has been installed.

7. (currently amended) The method of claim 6, further comprising the step of determining by said ~~controller~~ one or more processors if the (m-1)th code update has been installed;

wherein said Temporal Coupling File includes instructions which cause said ~~processor~~ one or more processors to determine if the (m-1)th code update has been installed.

8. (original) The method of claim 7, further comprising the step of generating an error message if the (m-1)th code update has not been installed.

9. (currently amended) The method of claim 1, ~~further comprising the steps of:~~
~~providing an wherein said~~ information storage and retrieval system ~~comprising~~ comprises one or more disk arrays and two or more clusters, wherein each of said two or more clusters includes, a ~~processor~~ one of said one or more processors, one or more device adapters interconnected to said one or more disk arrays, and said existing code, and wherein said Concurrent Code Load includes quiescing I/O to a first one of said two or more clusters;

said method further comprising the step of determining by a controller processor
disposed in said a first cluster one of said two or more clusters if one or more device adapters
disposed in a second one of said two or more clusters are operational before said ~~first~~ processor
disposed in said first one of said two or more clusters quiesces I/O to said first cluster;

wherein said Temporal Coupling File includes instructions which cause said ~~first~~
processor disposed in said first one of said two or more clusters to determine if one or more
device adapters disposed in said second cluster are operational before quiescing I/O to said first
cluster.

10. (original) The method of claim 9, further comprising the step of generating an error
message if one or more device adapters disposed in said second cluster are not operational.

11. (currently amended) An article of manufacture comprising a computer ~~useable~~
readable medium having computer readable program code disposed therein to update code in
said article of manufacture while that article of manufacture remains operational, said article of
manufacture further comprising one or more processors and existing code, wherein said one or
more processors use said existing code to operate said article of manufacture, and wherein said
existing code includes a Concurrent Code Load having (N) phases, the computer readable
program code comprising a series of computer readable program steps to effect:

receiving a code update image comprising a Temporal Coupling File, wherein said
Concurrent Code Load includes instructions to read said Temporal Coupling File;

executing ~~the~~ an (i)th phase of said Concurrent Code Load, wherein (i) is greater than or
equal to 1 and less than or equal to (N), and wherein (i) is initially set to 1;

determining if said (i)th phase of said Concurrent Code Load invokes said Temporal

Coupling File;

operative if said (i)th phase of said Concurrent Code Load invokes said Temporal Coupling File, reading instructions for said (i)th phase of said Concurrent Code Load from said Temporal Coupling File, and executing said instructions for said (i)th phase of said Concurrent Code Load;

completing said (i)th phase of said Concurrent Code Load;

ascertaining if (i) equals (N);

operative if (i) equals (N), operating said information storage and retrieval system using said code update.

12. (original) The article of manufacture of claim 11, said computer readable program code further comprising a series of computer readable program steps to effect if (i) does not equals (N):

incrementing (i);

repeating said executing, determining, completing, and ascertaining steps, and optionally said reading, executing, and incrementing steps.

13. (original) The article of manufacture of claim 11, wherein said Concurrent Code Load includes (N) indicators, wherein each of said (N) indicators is assigned to a different one of said (N) phases, and wherein each of said (N) indicators can have a first value or a second value, wherein said computer readable program code to determine if the (i)th phase of the Concurrent Code Load invokes the Temporal Coupling File further comprises a series of computer readable program steps to effect:

examining the (i)th indicator;

operative if said (i)th indicator is set to said first value, ascertaining that the (i)th phase of the Concurrent Code Load does not invoke the Temporal Coupling File; and

operative if the (i)th indicator is set to said second value, ascertaining that the (i)th phase of the Concurrent Code Load does invoke the Temporal Coupling File.

14. (original) The article of manufacture of claim 11, said computer readable program code further comprising a series of computer readable program steps to effect:

installing said existing code at a first time;

receiving said Temporal Coupling File at a second time, wherein said second time is later than said first time.

15. (currently amended) The article of manufacture of claim 11, ~~said computer readable program code further comprising a series of computer readable program steps to effect:~~

~~receiving a~~ wherein said code update image ~~comprising the~~ comprises a (m)th code update, wherein said Temporal Coupling File includes instructions which cause said processor to determine if the a (m-1)th code update has been installed.

16. (original) The article of manufacture of claim 15, said computer readable program code further comprising a series of computer readable program steps to effect generating an error message if the (m-1)th code update has not been installed.

17. (currently amended) The article of manufacture of claim 11, further comprising one or more disk arrays and two or more clusters, wherein each of said two or more clusters includes, ~~a processor~~ one of said one or more processors, one or more device adapters interconnected to said one or more disk arrays, and said existing code, and wherein said

Concurrent Code Load includes quiescing I/O to a first one of said two or more clusters, said computer readable program code further comprising a series of computer readable program steps to effect:

determining by a controller processor disposed in said a first cluster one of said two or more clusters if one or more device adapters disposed in a second one of said two or more clusters are operational before said first processor disposed in said first one of said two or more clusters quiesces I/O to said first cluster;

wherein said Temporal Coupling File includes instructions which cause said first processor disposed in said first one of said two or more clusters to determine if one or more device adapters disposed in said second cluster are operational before quiescing I/O to said first cluster.

18. (original) The article of manufacture of claim 17, said computer readable program code further comprising a series of computer readable program steps to effect generating an error message if one or more device adapters disposed in said second cluster are not operational.

19. (currently amended) A computer program product encoded in an information storage medium and usable with a usable with a programmable computer processor having computer readable program code embodied therein to update code in an information storage and retrieval system while that information storage and retrieval system remains in normal operation, said information storage and retrieval system further comprising one or more processors and existing code, wherein said one or more processors use said existing code to operate said information storage and retrieval system, and wherein said existing code includes a

Concurrent Code Load having (N) phases, comprising:

computer readable program code which causes said ~~programmable computer processor~~
one or more processors to receive a code update image comprising a Temporal Coupling File,
wherein said Concurrent Code Load includes instructions to read said Temporal Coupling File;

computer readable program code which causes said ~~programmable computer processor~~
one or more processors to execute ~~the~~ an (i)th phase of said Concurrent Code Load, wherein (i)
is greater than or equal to 1 and less than or equal to (N), and wherein (i) is initially set to 1;

computer readable program code which causes said ~~programmable computer processor~~
one or more processors to determine if said (i)th phase of said Concurrent Code Load invokes
said Temporal Coupling File;

computer readable program code which, if said (i)th phase of said Concurrent Code
Load invokes said Temporal Coupling File, causes said ~~programmable computer processor~~ one
or more processors to read instructions for said (i)th phase of said Concurrent Code Load from
said Temporal Coupling File, and execute said instructions for said (i)th phase of said
Concurrent Code Load;

computer readable program code which causes said ~~programmable computer processor~~
one or more processors to complete said (i)th phase of said Concurrent Code Load;

computer readable program code which causes said ~~programmable computer processor~~
one or more processors to ascertain if (i) equals (N);

computer readable program code which, if (i) equals (N), causes said ~~programmable~~
~~computer processor~~ one or more processors to operate said information storage and retrieval
system using said code update.

20. (currently amended) The computer program product of claim 19, further comprising computer readable program code which, if (i) does not equals (N), causes said ~~programmable computer processor~~ one or more processors to increment (i).

21. (currently amended) The computer program product of claim 19, wherein said Concurrent Code Load includes (N) indicators, wherein each of said (N) indicators is assigned to a different one of said (N) phases, and wherein each of said (N) indicators can have a first value or a second value, wherein said computer readable program code to determine if the (i)th phase of the Concurrent Code Load invokes the Temporal Coupling File further comprises:

computer readable program code which causes said ~~programmable computer processor~~ one or more processors to examine the (i)th indicator;

computer readable program code which, if said (i)th indicator is set to said first value, causes said ~~programmable computer processor~~ one or more processors to ascertain that the (i)th phase of the Concurrent Code Load does not invoke the Temporal Coupling File; and

computer readable program code which, if the (i)th indicator is set to said second value, causes said ~~programmable computer processor~~ one or more processors to ascertain that the (i)th phase of the Concurrent Code Load does invoke the Temporal Coupling File.

22. (currently amended) The computer program product of claim 19, further comprising:

computer readable program code which causes said ~~programmable computer processor~~ one or more processors to install said existing code at a first time;

computer readable program code which causes said ~~programmable computer processor~~ one or more processors to receive said Temporal Coupling File at a second time, wherein said

second time is later than said first time.

23. (currently amended) The computer program product of claim 19, further comprising ~~computer readable program code which causes said programmable computer processor to receive a~~ wherein said code update image comprising the comprises a (m)th code update, wherein said Temporal Coupling File includes instructions which cause said processor to determine if ~~the a~~ a (m-1)th code update has been installed.

24. (currently amended) The computer program product of claim 23, further comprising computer readable program code which causes said ~~programmable computer proecessor~~ one or more processors to generate an error message if the (m-1)th code update has not been installed.

25. (currently amended) The computer program product of claim 19, further comprising one or more disk arrays and two or more clusters, wherein each of said two or more clusters includes ~~a processor~~ one of said one or more processors, one or more device adapters interconnected to said one or more disk arrays, and said existing code, and wherein said Concurrent Code Load includes quiescing I/O to a first one of said two or more clusters, further comprising:

computer readable program code which causes a ~~controller processor~~ processor disposed in ~~said a first eluster~~ one of said two or more clusters to determine ~~by a controller disposed in said first cluster~~ if one or more device adapters disposed in a second one of said two or more clusters are operational before said ~~first processor~~ disposed in said first one of said two or more clusters quiesces I/O to said first cluster;

wherein said Temporal Coupling File includes instructions which cause said first

processor disposed in said first one of said two or more clusters to determine if one or more device adapters disposed in said second cluster are operational before quiescing I/O to said first cluster.

26. (currently amended) The computer program product of claim 25, further comprising computer readable program code which causes said ~~programmable computer~~ processor disposed in said first cluster to generate an error message if one or more device adapters disposed in said second cluster are not operational.